NEW INSECTICIDES FOR CONTROL OF THE COTTON INSECTS IN 1957

by

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Spiny bollworm *Earias fabia* Stoll, leafhopper *Chlorita biguttula* Ishida, and leafroller *Sylepta derogata* Fabricius are the major cotton pests in Taiwan. Heavy infestation of these insects in the cotton belt usually occur every year. During October the infestation increases. Conservative esitmates of the loss in yield to be expected in the field, range from 40 to 80 per cent. Since the advent of DDT, aldrin, Dieldrin, and endrin the recommended spray program for control of these pests in Taiwan have been widely carried out for eight years (1949 to 1956) endrin, Dieldrin, and aldrin were superior to DDT, and endrin gave the best results of the three in the controlling these pests. Recently the spiny bollworm and the leafhopper have apparently developed a resistance to chlorinated hydrocarbon insecticides such as DDT and others. The use of modern insecticides on cotton crops has been accompanied by increases in infestation by red spider mites *Tetranychus spp.* which have become an ever-increasing problem to the grower of cotton crops. This is often attributed to destruction of the natural enemies of the red mites. In the experiments Gusathion, Trithion, and metasystox were used and were compared with endrin. The results of the tests are given in this paper.

Materials and Metheds.— The investagations were conducted at Taidou-kung. Chia-yi county in Taiwan in 1957. All insecticides were tested with three different concentrations of the spray. 12 different treatments and three untreat plots were assigned at random to each block with three replications. Each plot had 40 sq., m., and contained 80 plants. Each plot had 5 rows with 16 plants per row. The variety of cotten which was sowed on June 27 was Kuan-tung No. 119. Sprays were applied from emulsifiable concentrate and applied with a small type of automatic sprayer. Applications were made from August 13 to October 3, it was followed at 10 day intervals for six times. The rate of applications early in the season was 1000 liters on 1st, 2nd and 3rd sprayings and later in the season was increased to 1200 liters of insecticidal solution on 4th, fifth and sixth sprayings per hectare. Percentage of infested leaves was determined by 10 plants selected at random from the central rows of each plot on October 2 and record of the number of the infested and uninfested leaves on each plot.

The number of bolls on each plant was also counted. The number of adult mites and eggs on all examined plants was counted with aid of a hand lens having a 1.5m. sq. field on October 4. Each leaf was selected randomly with three replications. six

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leaves of each plant were determined from 10 plants selected at random from the central rows of each plant, percentage of infested leaves and bolls were converted to the angle and were calculated on 5% and 1% at L. S. D. level.

Results.— These insecticides gave excellent control of the leafhopper and with exception of metasystox also gave promising results against the leafroller. Good control of the red mites was obtained with Trithion and metasystox, endrin and thion were not so effective as the other insecticides. The endrin, Trithion and Gusathion gave especially good results against the spiny bollworm. 0.10% gusathion and and 0.10% Trithion were equaly as effective as 0.05% endrin in controlling this pest. Metasystox in various concentrations was not so effective as the others.

The results of these tests are given in table 1, 2 and 3.

Teble 1. Effectiveness of treatments against leafhopper and leafroller in 1957

Chemical treatments	Leaves infested by leafhopper		Leaves infested by leafroller	
	percent	Angle	percent	Angle
Endrin emulsion 0.0125%	1.04	4.54	0	0
Endrin emulsion 0.025%	1.03	4.99	0	0
Endrin emulsion 0.05%	0.25	2.26	0	0
Gusathioe emulsion 0.025%	0.90	4.43	0.10	1.05
Gusathioe emulsion 0.05%	0.70	2.71	0.11	1.05
Gusathion emulsion 0.10%	0.30	2.58	0	0
Trithion emulsion 0.025%	1.27	6.43	2.47	5.25
Trithion emulsion 0.05%	0.43	2.18	0.10	1.05
Trithion emulsion 0.10%	0	0	0	0
Metasystox emulsion 0.025%	0.50	2.35	12.50	18.73
Metasystox emulsion 0.05%	2.00	5.29	19.92	15.12
Metasystox emulsion 0.10%	3.77	10.21	7.40	14.72
Check (untreated plot)	75.06	62.32	6.69	10.35
L. S. D. at 5% level		15.09		11.84
L. S. D. at 1% level		20.32		15.94

Table 2. Numbers of red mites on 60 leaves of cotton plants in the various treatments in 1957.

Chemical Treatments	Active stages	eggs
Endrin emulsion 0.125%	558.00	340.70
Endrin emulsion 0.025%	46.30	11.30
Endrin emulsion 0.05%	393.00	139.00
Gusathion emulsion 0.025%	276.00	281.70
Gusathion emulsion 0.05%	244.70	62.30
Gusathion emulsion 0.10%	447.70	64.00
Trithion emulsion 0.025%	20.00	22.30

Trithion emulsion 0.05%	4.00	2.00
Trithion emulsion 0.10%	1.00	3.30
Metasystox emulsion 0.025%	3.00	19.30
Metasystox emulsiox 0.05%	7.30	0.60
Metasystox Check 0.10%	4.70	1.00
(untreated plot)	28.91	8.60

Table 3. Effectiveness of the insecticides against spiny bollworm in 1957

Chemical Treatments	Boll infested		Number of Bolls	Yield of seed Cotton kg/ha	Index
	Percent	Angle	per plant		
Erdrin emul. 0.0125%	12.17	20.39	29.40	2,237.50	177.12
Erdrin emul. 0.025%	5.43	12.81	30.70	2,402.50	190.20
Erdrin emul. 0.05%	2.33	8.41	33.00	2,555.00	203.30
Gusathion emul. 0.025%	14.34	21.95	27.40	1,910.00	151.20
Gusathion emul. 0.05%	9.00	17.35	28.50	2,167.50	171.60
Gusathion emul. 0.10%	8.80	16.35	33.30	2,460.00	194.70
Trithion emul. 0.025%	11.10	19.42	29.32	2,070.00	163.90
Trithion emul. 0.05%	8.78	17.11	32.10	2,277.50	180.30
Trithion emul. 0.10%	5.57	13.31	32.70	2,652.50	210.00
Metasystox E. 0.025%	30.48	32.48	24.20	1,395.00	110.00
Metasystox E. 0.05%	22.11	27.11	25.10	1,695.00	134.20
Metasystox E. 0.10%	9.57	17.61	26.00	1,910.00	151.20
Check (untreated plot)	20.97	26.29	15.20	1,263.30	100.00
L. S. D. at 5% level		11.54	4.17	325.00	
L. S. D. at 1% level		15.54	5.62	437.50	

Discussion.— Percentage of leaves infested by the leafhopper was significantly lower than in the check, there was no significant difference between the different treatments and the concentartion of sprays.

Percentage of leaves infested by leafroller except the metasystox was used was significantly lower than in the check, but infestation of the reafroller when metasystox was applied was higher than in the check. There was also a significant difference between the different treatments and the concentrations of sprays, as shown in Table 1.

The number of adult mites varied depending on the various concentrations of sprays used. Endrin and Gusathion showed higher numbers than the others and the check. It was revealed that the Trithion and metasystox gave good results in controlling this red mite, as shown in Table 2.

The number of bolls on plant was significantly higher than the check, there were also significant differences between the different treatments and the concentrations of sprays. According to the yield of seed cotton, high concentrations of sprays of these

insecticides gave best results in the experiments, as shown in Table 3.

Summary.— In the experiment various concentration of sprays of various insecticides were found to be about equal in effectiveness against the leafhopper. Endrin, Gusathion and Trithion were also effective against the leafroller whether in high and low concentrations but metasystox was not effective in controlling the leafroller. Trithion and metasystox gave best results against the red mites. In the endrin and Gusathion treatments, the density of red mite population of both adults and eggs became heavier than in other treatments or in the check, It might cause damage to the cotton crop, High concentrations of sprays of these insecticides with exception of metasystox gave excellent results against the spiny bollworm. The number of bolls on plants receiving treatments was at 24.20 to 33.30 bolls per plant as compared with 15.20 bolls per plant in the check. The treated plots of seed cotton yielded at 1359 to 2652.25 kgs per hectare as compared with 1263.30 kgs in the check. 0.10% Trithion and 0.10% Gusathion were about equal as effective as 0.05% endrin. Therefore they were superior to the other concentrations of sprays in these experiments.

農用新藥劑防治棉害蟲試驗

陶　家　驊

摘　要

本試驗結果，以19.5% Endrin，20% Gusathion，37% Trithion 和50% Metasystox 乳劑等防治棉浮塵子，施用高濃度或低濃度者，均屬有效。防治棉捲葉蟲，除 Metasystox 外，無論高濃度或低濃度者，亦屬有效。Trithion 和 Metasystox 防治斑黑點紅蜘蛛，成效特別顯著，唯獨 Endrin 和 Gusathion 區，紅蜘蛛成蟲及卵之密度較其他施藥區和對照區甚高，猶有影響棉株後期生育，良匪淺鮮。施藥區每株結鈴數平均24.20～33.30枚。對照區祇有15.20枚。每公頃籽棉產量達1,359～2,652.50公斤，對照區每公頃1,263.30公斤，其中以施用高濃度產量最高，如0.05% Endrin 0.10% Trithion 及 0.10% Gusathion 諸施藥區，彼此間差不顯著，實爲理想藥劑施用之適當濃度。

誌謝：本試驗期中承楊所長致福督促和鼓勵，得以順利完成，農藝系惠供試驗地，蔡富先生惠予協助栽培和管理，農復會劉博士廷蔚惠贈藥劑。又承本系同仁湯慶銓暨余健敏兩君協助調查和分析，得力甚多，謹此附致謝忱。